



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Biomedicina, Neuroscienze e Diagnostica avanzata		
ACADEMIC YEAR	2023/2024		
MASTER'S DEGREE (MSC)	NEUROSCIENCE		
SUBJECT	INFORMATION PROCESSING SYSTEMS IN NEUROSCIENCE		
TYPE OF EDUCATIONAL ACTIVITY	C		
AMBIT	20879-Attività formative affini o integrative		
CODE	22014		
SCIENTIFIC SECTOR(S)	ING-INF/05		
HEAD PROFESSOR(S)	MANNONE MARIA	Professore a contratto	Univ. di PALERMO
	CATERINA		
OTHER PROFESSOR(S)			
CREDITS	6		
INDIVIDUAL STUDY (Hrs)	94		
COURSE ACTIVITY (Hrs)	56		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	1		
TERM (SEMESTER)	2° semester		
ATTENDANCE	Mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS			

DOCENTE: Prof.ssa MARIA CATERINA MANNONE

PREREQUISITES	A basic level of Information Technology (as example the ECDL - European Computer Driving License) is recommended but not compulsory.
LEARNING OUTCOMES	<p>Knowledge and Understanding – Student will be expected to know and understand: (1) the structure and the organization of a medical information system; (2) the theoretical background of the main experimental approaches for medical data processing and analysis in neuroscience; (3) design, develop, and implement simple experimental trials for medical data processing and analysis in neuroscience.</p> <p>Applying knowledge and understanding – Learning and ability to apply knowledge by the student will be focused to the opportunity to develop adequate skills within the general field of Computer Science and the Artificial Intelligence domain. Learning and ability to apply knowledge by the student will be also focused on the practical design and development of medical data processing and analysis tasks in neuroscience.</p> <p>Making judgments – The teaching activities carried out during the course will allow students to develop the ability to evaluate and integrate in an autonomous and critical target and select the most adequate strategies and procedures for medical data processing and analysis in neuroscience.</p> <p>Communication skills - During the course it will be underlined the importance to communicate in a comprehensible way, even to non-experts, the meaning of medical data analysis studies, the different areas in which it is possible to apply the experimental techniques and of bioinformatics procedures discussed during the course</p> <p>Learning ability – Student will gain competence and adequate skills to develop future studies through the application of computer science strategies within the neuroscience.</p>
ASSESSMENT METHODS	<p>The evaluation phase is based on a final oral interview aimed at evaluating both theoretical knowledge and full understanding of the main issues dealt with during the course, i.e. the structure of a processing system, of a clinical information system, of a clinical decision support systems, of the Artificial Intelligence based techniques for medical data processing and analysis on neurosciences. The candidate's ability to present and elaborate the previous concepts as well as the ability to design a practical experimental case study for medical data processing and analysis in neuroscience will be evaluated. The vote is expressed in thirtieth, with a positive result when the total final score ranges between 18 and 30. In order to reach a positive evaluation, a candidate will have to answer at least three oral questions concerning the topics of the course, with a reference to the teaching materials provided by the teacher and/or the suggested texts. The final evaluation aims at assessing both the level of knowledge and understanding gained by a candidate on the topics of the course as well as its acquisition of interpretative competence and autonomy of judgment in the implementation of appropriate experimental procedures for use and interaction with Information Systems in Neuroscience. The level of sufficiency will be reached when a candidate shows general knowledge and understanding of the main course topics and guidelines and demonstrates minimal skills in appropriate application of Information Systems in Neuroscience interaction techniques aimed at the realization of specific examples of experimental studies; he/she has also to exhibit communication skills and arguments for transferring its knowledge and understanding to the examiners. Below this threshold, the examination result will be insufficient. The more a candidate with its arguments and knowledge is able to interact with the examiners and its knowledge and skills emerge in using of appropriate techniques for carrying out automatic medical data analysis tasks, the higher the evaluation vote will be.</p>
EDUCATIONAL OBJECTIVES	<p>The course aims at providing basic knowledge associated to the Information and Communication Technology for medical data processing and analysis in neuroscience. The course starts with an introduction to computer systems, and then presents the structure and the organization of both medical information systems and clinical decision support systems. In addition, the course will introduce the main techniques for medical data processing and analysis in neuroscience and it will be designed and developed simple experimental trials in the related application domain.</p>
TEACHING METHODS	Academic lectures and training practices in computer room.
SUGGESTED BIBLIOGRAPHY	<p>KAREN A. WAGER, FRANCES WICKHAM LEE, JOHN P. GLASER - HEALTH CARE INFORMATION SYSTEMS. A Practical Approach for Health Care Management - 4th Edition - ISBN: 978-1-119-33718-8, Jossey-Bass, A Wiley Imprint.</p> <p>KAREN A. WAGER, FRANCES WICKHAM LEE, JOHN P. GLASER - HEALTH CARE INFORMATION SYSTEMS. A Practical Approach for Health Care Management - 2nd Edition - ISBN 978-0-470-38780-1, Jossey-Bass, A Wiley Imprint.</p>

SYLLABUS

Hrs	Frontal teaching
4	Course introduction; Information representation and coding; Files, images, signals, and medical data.
4	Main characteristics of an Information Processing System
4	Information and Communication Technologies in the Health domain (e-Health)
4	An introduction to databases, DBMSs, and Information Systems.
4	Electronic Health Record (EHR), Clinical Information Systems
4	Clinical Decision Support Systems
8	Medical Data Processing and Analysis in Neuroscience

Hrs	Practice
3	An introduction to Artificial Neural Networks and related configuration techniques.
3	An introduction to Support Vector Machines and related configuration techniques.
9	Data Mining Techniques for Medical Data Analysis in Neuroscience.
9	Medical Image Processing and Analysis in Neuroscience.